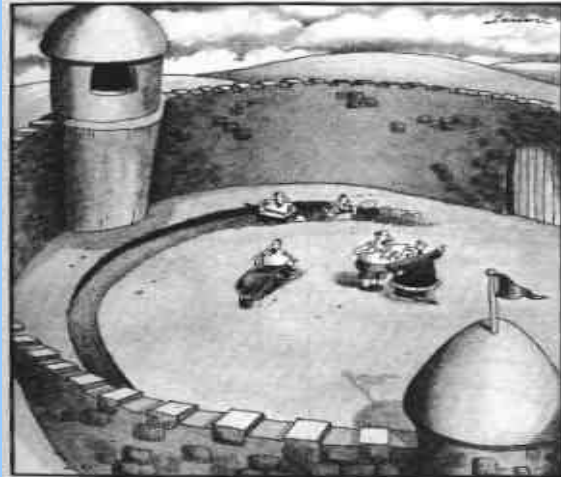


ENERGY-EFFICIENT LABORATORIES

Realizing Performance Benefits



**Suddenly a heated exchange took place
between the king and the moat contractor**

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©

ENERGY-EFFICIENT LABORATORIES

Realizing Performance Benefits

E-Cube is a technical consulting firm that specializes in energy efficiency, through thermal comfort, refrigerant management, operation and maintenance of building systems, occupant productivity, and indoor air quality.

E-Cube's services include:

- Analysis:
- Commissioning:
- Design Assistance:
- Programming:
- Monitoring and Verification:
- Performance Contracting Support:
- Operation & Maintenance (O&M) Program Support:

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ENERGY-EFFICIENT LABORATORIES

Realizing Performance Benefits

OR HOW TO GET WHAT YOU'VE PAID FOR

Providing Working/Integrated Systems



Commissioning

ENERGY-EFFICIENT LABORATORIES

Realizing Performance Benefits

The GSA recently completed two new energy-efficient laboratory facilities.

Containing a mix of environmental and energy efficient measures.

NOAA

National Oceanic and Atmospheric Administration

NWQL

National Water Quality Laboratory

ENERGY-EFFICIENT LABORATORIES

Realizing Performance Benefits



NOAA (National Oceanic & Atmospheric Administration)

The new NOAA Building consists of 372,000 gross sq ft of office, conference rooms, computing centers, with wet and dry laboratories, and rooftop laboratories. The building houses the National Weather Service, and provides environmental research.

Energy saving measures, include:

- Exhaust heat recovery
- Electrical end-use metering
- Water conservation measures
- High Efficiency chillers and electric motors
- 720 offices with operable windows and individual HVAC/lighting controls

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Realizing Performance Benefits



NWQL (National Water Quality Laboratories)

The new NWQL Building consists of 150,000 gross sq ft of wet and dry laboratory space. The purpose of this state of the art laboratory is to, describe the status of the Nation's water resources, identify trends in water resources, and develop an understanding of the natural and human factors affecting water quality.

Energy saving measures, include:

- VAV fume hoods
- High Efficiency chillers and cooling towers
- Variable Frequency Drives (VFD)
- Indirect/direct evaporative cooling
- Exhaust heat recovery

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GSA

EEM Process

**Utility design
assistance**

**Screening
measure list
with lifecycle
calculations**

**ESPC - Performance
based funding**

 **E Cube, Inc.**
ENERGY EFFICIENT CONSTRUCTION

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Realizing Performance Benefits

GSA

**Construction
Commissioning
Process**

**Well
structured
Process**

**Design through
Construction &
Occupancy**

**Mandatory
Contractor
Participation
(NOAA only)**

 **E Cube, Inc.**
ENERGY EFFICIENT CONSTRUCTION


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Realizing Performance Benefits

Commissioning Optimization

Purpose and Scope

- Establish smooth and reliable operation of major systems,
- Identify problems, warranty issues and corrective action using EMS trend logs,
- Propose opportunities for improvements and optimization,
- Document impacts

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Realizing Performance Benefits

Commissioning Optimization

Benefits

- Improved comfort and indoor air quality
- Sustained and increased energy and environmental efficiency
- Reduced maintenance burden and costs
- Extended equipment life

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Realizing Performance Benefits

Post-Occupancy Commissioning Optimization

NOAA Impacts

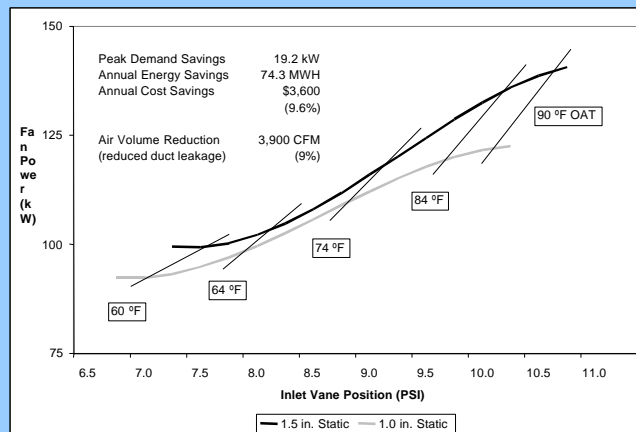
Types of Impacts	Systems Impacted	Budgets Impacted	Annual Budgets
Corrected / Improved Control Strategies	Central Hot Water	Utility Costs	\$ 660,000
Reduced equipment Downtime	Central Chilled Water	Operations and Maintenance	\$ 420,000
Warranty Service	Air Distribution	Total	\$ 1,080,000
Efficiency opportunities	EMS Controls		
Improved operation	ALL	5 – 10% of Total	\$ 50,000 - \$100,000

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Realizing Performance Benefits

Post-Occupancy Commissioning Optimization

NOAA Fan Static Pressure Reduction Impact



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Realizing Performance Benefits

LESSONS LEARNED

hands-off
testing

track critical
systems

clearly specified in contract
documents

empower commissioning
team

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CONCLUSIONS

High-Tech
Measures

Great potential
but increased risk

Commissioning improves process

Best when included in
construction contract
documents